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PORTABLE VISUAL DISPLAY DEVICE WITH A COLLAPSIBLE PRESENTATION SCREEN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a presentation screen for the presentation of still or moving visual images such as pictures, text or data to a group or a number of people in typical and everyday business, training, education, promotion or exhibition environments. The screen is of the diffusion type, using diffusion means for displaying the images on the front viewing surface. The screen may collapse into a smaller configuration such as to significantly increase its portability as required for being readily moved from room to room or travelling from place to place. The field of the invention also relates to the various forms of art that may be employed in its various embodiments as, or as part of, a visual display device.

The field of this invention is that of flexible, rear projection screens and is not intended to include front (i.e. reflective) display screen applications, active display screens or rigid screens.

2. Description of Prior Art

Visual Display by means of cathode ray tube (CRT) devices is commonly used for computer monitors and televisions and can have relatively large screens (up to 40 inch, 1 meter) but these are bulky and very heavy and thus not truly portable.

Visual display by rear projection such as in TV units can provide a large screen area but such devices are not yet common and again the devices are large and bulky and thus not truly portable.

Visual display devices using a Liquid Crystal Display (LCD) are common particularly in laptop computers and are highly portable but their limited screen size (14 inch, 35 cm) makes them unsuitable for presentational use involving several persons viewing the screen simultaneously in comfort.

Various other displays are appearing such as plasma screens that are large screen (up to 42 inch currently, 105 cm) and that are almost flat for hanging on a wall, but again are relatively heavy and bulky so not truly portable.

Visual display by large screen front projection means is popular in business and at home. Use may be in circumstances of a fixed set-up in a special room or for use in a portable or travelling manner. However the latter requires some preparation—possibly in front of a waiting client or audience. Depending on circumstances it may require suitable lighting conditions, a screen and the physical space to the projector screen to be available. This can be a further disadvantage when associated with use where visiting in a business environment since it may be considered professionally “intrusive”, to impose these requirements on a client even for informal presentations.

Many visual display devices have tried to employ the advantages of the systems above within a more or less portable package. In general these are subject to the limitations either that the viewable screen is smaller than the case within which it is carried, or where the display screen is larger than the case and in some way disassembled for storage and carriage, use of the screen requires user intervention to then assemble the screen and attach it to other required elements which is again an inconvenience and takes time.

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There are known methods for the collapsing of seamless front projection screens that employ flexible screens which fold away for storage. However these collapsing methods have not generally proved applicable in translucent diffusion applications for the reasons set out below.

Front Projection screens are not translucent and therefore typically consist of a reflective front surface with a reinforced backing that provides considerable physical “body” to the material such that it does not require to be stretched to operate or reflect light uniformly—although it may be hung or stretched to stay in an approximately planar condition. Further, physical damage such as creases or folds in the screen surface are not highly critical to the optical performance as no light passes through the material.

Flexible screens suitable for use in say a portable rear projection application, are by necessity of their unique optical transmissive and controlled diffusive requirements, very thin, of a totally different translucent and very homogeneous material without any reinforcing layer, must be under at least minimal tension and physical distortion and non-planarity must be avoided. Further, any crease or fold of the material (even if not still physically present or not) may cause optical distortion to the passing light and images or cause “rainbow effect” or “white spots” and result in very irritating screen flaws to a viewer.

As a result, the technology of the screen, its material and also the optical and physical requirements in use are very different from those applicable to reflection screens. Further the demands of preserving the screen optical qualities and screen longevity (especially in required highly repeated or rapid opening and closing actions) are much more critical in “fit for purpose” concerns. In consequence particular difficulties are encountered in developing collapsible screens of this type, and it has not been generally possible to apply collapsible concepts from the reflection screen art to screens designed for the application of the present invention.

Specifically, relevant prior art is list here:

D1: U.S. Pat. No. 4,323,301 (Spector D.) Apr. 6, 1982 A collapsible and portable flexible screen erected by inflating by gas cartridge a tubular rectangular loop.

D2: EP-A-0 424 074 (Failla S.) Apr. 24, 1991 Segmented rigid display screens that are collapsible by hinging/sliding means.

D3: EP-A-0676 893 (Projectavision Inc) Oct. 11, 1995 Cabinet for portable rear-screen television projector that features a light shield.

D4: U.S. Pat. No. 2,827,955 (Hurley A.) Mar. 25, 1958 Folding Motion Picture Screen (front projection only).

OBJECTS OF THE INVENTION

Accordingly:

It is an object of the present invention that it generates the viewable optical images on the front viewing surface of the presentation screen by the diffusion of the light comprising of images that originate from a light source at a distance to the rear of the front viewing surface.

It is an object of the present invention that it provides a visual display screen with a viewable surface area that is sufficiently large such that it may be readily and comfortably viewed by several people.

It is an object of the present invention that it may be viewed in typical in-door environments without need for further space or apparatus (other than if an external media source is required).

It is an object of the present invention that the screen assembly is collapsible such that the viewable screen area is